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The Effect of Talking on oral Thermometry

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THE EFFECT OF TALKING ON ORAL THERMOMETRY

by

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Master of Science in the Field of Nursing

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I certify that I have read this thesis and that in my opinion it is adequate, in scope and quality, as a thesis for the degree of Master of Science.

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CHAPTER I

THE STUDY IN BRIEF

From Hippocrates' search for fever by placing his hands upon various parts of his patients' warm bodies[1] to present-day rapid, precise methods of electronically measuring body heat, keen interest has persisted in the determination of body temperature. This concern has existed because the ascertaining of the degree of body temperature aids in evaluating the severity of an illness, its course and duration, the results of therapy, or even the presence of an organic disease.

This study was done to probe into the influence of talking upon sublingual body temperature.

I. THE PROBLEM

Statement of the Problem

For some years this country has had a severe shortage of professional nurses. Because the need for nursing services has been acute, hospitals have employed larger numbers of nurse assistants, many of whom have been untrained. This has

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[1]Herman Goodman, "Early Contributors to the Construction of the Thermometer," Medical Times, 84:934, September, 1956.

promoted "an alarming dilution of the quality of service."[2] Abdellah and Levine found that patient satisfaction was greatest when professional nurses gave 50 per cent of direct patient care.[3] The Surgeon General's Consultant Group on Nursing reported that the proportion of direct nursing care given by registered nurses dropped from about 40 per cent in 1950 to 30 per cent in 1962, with some hospitals admitting that nurse assistants supplied as much as 80 per cent of the direct patient care.[4]

It would appear that the watering-down of nursing services would encourage carelessness with hospital routines, some of which are vital to patient welfare. One such routine was lifted for scrutiny in this study--the evaluation of body temperature by sublingual thermometry.

Body temperature is considered among the initial observations usually made by a physician in establishing a diagnosis.

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[2] Alvin C. Eurich (Chairman), Toward Quality in Nursing, Public Health Service Publication No. 992, United States Department of Health, Education, and Welfare, Washington: United States Government Printing Office, 1963, p. 15.

[3] Faye G. Abdellah and Eugene Levine, Effect of Nurse Staffing on Satisfactions with Nursing Care, Hospital Monograph Series No. 4, Chicago: The American Hospital Association, 1958, p. 35.

[4] Eurich, loc. cit.

It is referred to as one of the "vital signs."[5] Because of its consequence, this part of the familiar "TPR" must be treated with intelligent awe and accuracy of measurement and recording. In this study the effect of talking upon oral thermometry was examined.

Need for the Study

It was felt that the superimposing of poorly trained nursing assistants upon a deepening lack of professional nursing care threatened the attention given to body temperature evaluations. Further, there seemed to be a trend toward reducing the frequency of taking the "TPR." In one hospital this was done, following a study which revealed that over 90 per cent of the 1,846 temperature readings were normal, with only 53 of the 132 elevations above 99.4° F.[6] If the taking of temperatures is to be practiced less often, it would seem imperative that when it is done it should be performed with consistent exactness.

It was viewed highly probable that scarce notice has been paid to patients' talking habits and their possible effects upon oral thermometer readings. On the other hand, is such notice

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[5]Alice L. Price, The Art, Science and Spirit of Nursing, Second edition, Philadelphia: W. B. Saunders Company, 1959, p. 454.

[6]Marie A. Schmidt, "Are All T.P.R.'s Necessary?" The American Journal of Nursing, 58:559, April, 1958.

really essential? In actuality, does talking prior to sublingual thermometry preclude accuracy of the oral thermometer's registering of body heat? The seeming want of experimental evidence towards definite answers to these questions served to focus the need for the study. Furthermore, such an investigation appeared needful from the researcher's observation that very often the afternoon temperatures were taken when patients were visiting with each other or with friends and relatives. Afternoon temperature evaluations seemed important to patient care because they were made at the time of day when body temperatures were on upward diurnal swings.[7] It was believed that frequently the thermometers were placed in the patients' mouths immediately after they had been occupied with talking. Some of the patients were very talkative, often carrying the bulk of the verbal exchanges. Consequently this thermometry seemed significant indeed and worthy of careful performance.

Purpose of the Investigation

It was the purpose of this study to experimentally determine the influence of talking on three-minute oral thermometry.

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[7] Barry G. King and Mary Jane Showers, Human Anatomy and Physiology, Fifth edition, Philadelphia: W. B. Saunders Company, 1963, p. 383.

The Hypothesis

The hypothesis adopted for the study was that after a period of talking the sublingual temperature is lowered.

II. ASSUMPTIONS

The following assumptions were made for the study:

1. The oral thermometers were uniform in their registration of body temperatures.

2. The subjects had adequate skill in the placement and removal of oral thermometers.

3. The restrictions imposed upon the subjects were sufficient to control significant variables in the experimentation. The variables controlled were: eating, drinking, smoking, gum-chewing, mouth breathing and talking.

4. The investigator's estimations of the thermometers' registrations to the nearest two-tenths of a degree were uniform throughout the study.

III. LIMITATIONS

The limitations of this study were:

1. Sixty-one college students volunteered for participation in the investigation.

2. Room temperatures were not controlled in the experiment. Each session was conducted in a comfortable room.

3. If a subject had to leave the experimental room her verbal assurance of observing the imposed restrictions was accepted as reliable.

4. Some of the subjects indulged in giggling and momentary opening of mouths during the temperature-taking.

5. Some of the subjects talked out briefly during the thirty to sixty second interval between the end of the nasal breathing and the start of the three-minute control thermometry.

6. Even with the investigator's caution, there were some subjects who seemed to read louder and/or faster than they would have under ordinary conditions.

IV. TERMS DEFINED

In this study there were a number of terms employed in the manner as given below:

1. Any nursing service personnel who gives direct, bedside, patient care was called <u>nurse</u>.

2. An <u>oral thermometer</u> was an oral thermometer used to measure body temperature sublingually.

3. The measuring of body temperature by an oral thermometer was called <u>oral thermometry</u>.

4. A term used interchangeably with "oral thermometry" was <u>sublingual thermometry</u>.

5. As measured by oral thermometry, 98.6° Fahrenheit was considered the normal body temperature.

6. Any body temperature above 98.6° F. was called a fever.

V. METHOD OF STUDY

The experimental method employing the one group technique was used to test the effect of talking upon the sublingual temperature. Sixty-one female students in the health professions of a selected university became subjects. For a thirty-minute period the subjects did not eat, drink, smoke, chew gum, mouth-breathe, or talk. Three-minute, control, oral temperatures were then taken, followed by ten minutes of reading aloud. Next the three-minute experimental oral thermometry was done and the temperature reductions calculated. The probability of the significance of the observed temperature reductions was determined with the t test analysis of data.

The investigator's conclusions and recommendations for further research were outlined.

CHAPTER II

FROM THE WRITTEN

Temperature is a measure of the relative velocity of molecules and atoms.[8] Thus heat is generated in the human organism. Body temperature is the degree of heat maintained by the body, a balancing of heat produced and heat lost.[9] This marvelous adjustment of warm-blooded man to his often capricious external environment and the factors influencing accuracy of body temperature evaluation by oral thermometry were studied. The literature review was directed toward finding the significance of talking upon sublingual thermometry.

I. HUMAN BODY TEMPERATURE

The Range of Temperature

Normal body temperature is not a specific point on the thermometer but a range,[10] with a neutral zone in which heat

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[8] M. Esther McClain and Shirley Hawke Gragg, Scientific Principles in Nursing, Third edition, St. Louis: C. V. Mosby Company, 1958, p. 248.

[9] Price, op. cit., p. 455.

[10] Hugh Davson and M. Grace Eggleton (eds.), Principles of Human Physiology, Thirteenth edition, Philadelphia: Lea and Febiger, 1962, p. 759.

is neither lost nor gained. This zone was shown experimentally in a study of a nude man at rest in a basal state. For him the point of no heat lost or gained was reached at an environmental temperature of 86° F.[11] Most cells have a small range of adaptation to thermal changes.[12] This range of temperature within which cells maintain their existence is called the "biokinetic zone" and lies between 10° and 45° C. (50° and 113° F.)[13] For each enzyme there is an optimum temperature at which its action carries on with the greatest economy, and for those of the human body this temperature is about 37° C. (98.6° F.)[14]

There are survival bounds of temperatures for the human being within which the cells of the body support respiration and other vital functions that permit the life of the entire body. Best gave 79.5° to 110° F. as body heat limits for life.[15] Tuttle set his lower bounds at 77° F. and his upper

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[11]King, op. cit., p. 386.

[12]Arthur C. Giese, Cell Physiology, Second edition, Philadelphia: W. B. Saunders Company, 1962, p. 193.

[13]Ibid.

[14]W. W. Tuttle and Byron A. Schottelius, Textbook of Physiology, Fourteenth edition, St. Louis: C. V. Mosby Company, 1961, p. 53.

[15]Charles Herbert Best and Norman Burke Taylor, The Physiological Basis of Medical Practice, Seventh edition, Baltimore: The Williams & Wilkins Company, 1961, p. 885.

limit at 111° F.[16] DuBois' survival temperatures for the human organism were 74° to 111° F.[17] From these authorities' opinions it would seem that 74° to 111° F. represents the "biokinetic zone" for the human body.

The "Normal" Temperature

As it was previously stated, instead of one exact normal temperature there is a temperature range that shifts during the day. This action is known as the diurnal variation where the lowest temperature levels are in the early morning and the highest in the early evening, with gradual decline through the night.[18] No one really understands what "body temperature" means and consequently measurement of an average temperature is impossible.[19] Further, in one person body heat values vary in different locations of the body. The temperature of the sublingual space is a little lower than that of the rectum. The skin presents greatly diversified heat registration, and the liver is considered to be the warmest part of the body.[20]

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[16] Tuttle, op. cit., p. 343

[17] Eugene F. DuBois, Fever, Publication Number 13, American Lecture Series, A Monograph in American Lectures in Physiology, Edited by Robert F. Pitts, Springfield: Charles C. Thomas, Publisher, 1948, p. 9.

[18] King, op. cit., p. 383. [19] DuBois, op. cit., p. 3.

[20] Tuttle, op. cit., p. 342.

Despite the great variations of temperature in the human organism, many noted physiologists seem united in stating that for practical, diagnostic purposes, 98.6° F. is the "normal body temperature" when taken sublingually.[21,22,23]

II. THERMOTAXIS

The Thermostat

The almost unvarying body temperature of man living under a variety of environmental states points to a remarkable, efficient thermostatic control and regulating system.[24] The total heat lost in 24 hours must just equal the amount produced; otherwise the body temperature would rise or fall.[25] When the rate of heat lost by the body is exactly equal to the rate of heat produced, the person is said to be in "heat balance."[26] This balance is possible, thanks to a bit of nervous tissue of the midbrain forming the floor and part of the lateral walls

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[21]Arthur C. Guyton, Medical Physiology, Second edition, Philadelphia: W. B. Saunders Company, 1961, p. 950.

[22]Best, op. cit., p. 884.

[23]Paul B. Beeson, "Fever," in Principles of Internal Medicine by T. R. Harrison, et al. (eds.), Fourth Edition, New York: McGraw-Hill Book Company, Inc., 1962, p. 61.

[24]Best, loc. cit.

[25]Ibid., p. 886.

[26]Guyton, loc. cit.

of the third ventricle.[27] This is known as the hypothalamus and is located just below the thalamus and above the pituitary body.[28] (Figures 1 and 2)

The hypothalamus has been called the co-ordinating center of the autonomic nervous system,[29] the main center for integrating the body's visceral activities,[30] the "physiologic thermostat,"[31] and the "human thermostat."[32] It consists of specialized cells, some of which react to slight increases in blood temperature and others that respond to a fall in temperature.[33] These masses of gray matter or nuclei receive nerve fibers from the thalamus. Because the thalamus is intimate with the cerebral cortex, impulses from the cortex are able to reach the hypothalamus indirectly by this route. The medulla oblongata and the spinal cord also speed impulses to the thermostat.[34]

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[27]King, _op_. _cit_., p. 94. [28]Tuttle, _op_. _cit_., p. 466.

[29]King, _loc_. _cit_.

[30]Terence A. Roger, _Elementary Human Physiology_, New York: John Wiley Sons, Inc., p. 239.

[31]Khalil G. Wakim, Charles S. Wise, and Fred B. Moor, "The Normal Range and Regulation of Body Temperature," _Medical Arts and Sciences_, 13:83, Second quarter, 1959.

[32]L. L. Langley and E. Cheraskin, _The Physiology of Man_, Second edition, New York: McGraw-Hill Book Company, Inc., 1958, p. 178.

[33]Rogers, _loc_. _cit_. [34]Tuttle, _loc_. _cit_.

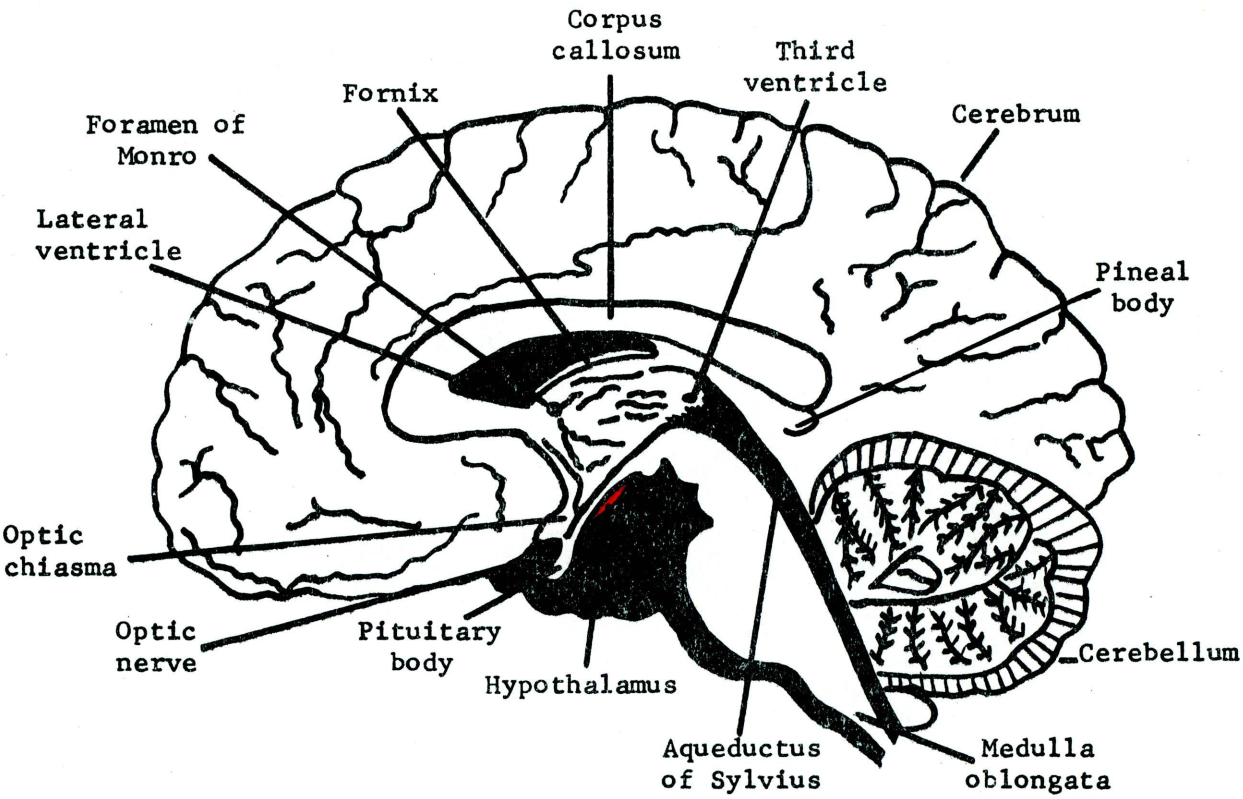

FIGURE 1

SAGITTAL SECTION OF BRAIN WITH HYPOTHALAMUS (in red)
(Based on Data from Maud Jepson, Anatomical Atlas, Revised, New York: Holt, Rinehart and Winston, Inc., 1958, p. 13)

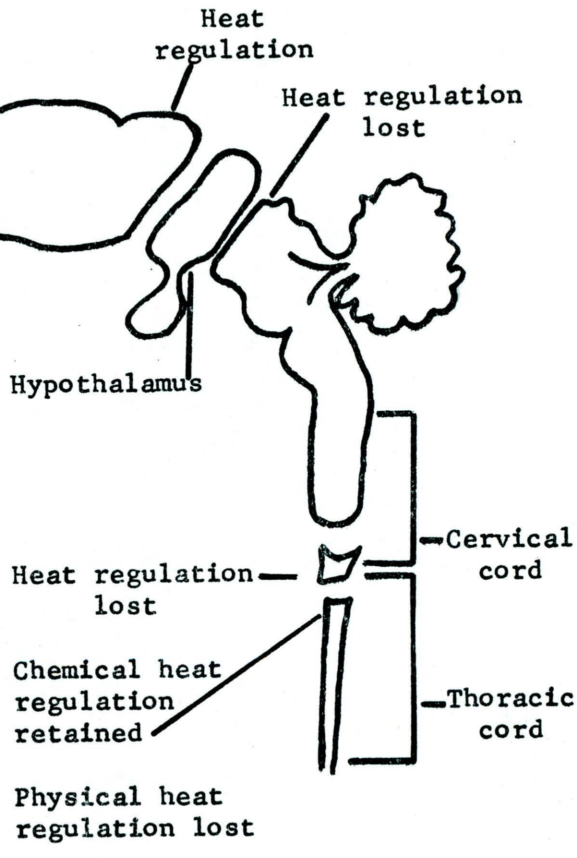

FIGURE 2

NERVOUS CONTROL OF HEAT REGULATION
(Based on Data from Charles Best and Norman Taylor, The Physiological Basis of Medical Practice, Baltimore: Williams & Wilkins, 1961, p.885)

Simply stated, "The nerve fibers of the autonomic nervous system supply the circuit which can start or stop the furnace and control the dampers."[35]

Mechanisms of Heat Regulation

Physical heat control. The effort to protect the body against overheating of its tissues is the most important work of the body's physiologic thermoregulator.[36] This process of increasing or decreasing the loss of heat is thermolysis or physical heat control.[37,38] Such regulation takes place in the skin, lungs and excretions by convection, conduction, radiation, evaporation, warming of inspired air, and urine and feces elimination.[39,40] The heat produced by an average man doing light work is close to 3000 Calories. The proportions of this which are dissipated by the various avenues, at ordinary room temperature, are given in approximations in Table I.[41]

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[35]Langley, loc. cit.

[36]James D. Hardy, "Physiology of Temperature Regulation," Physiological Reviews, 41:591, July, 1961.

[37]Tuttle, op. cit., p. 343.

[38]William D. Zoethout and W. W. Tuttle, Textbook of Physiology, Thirteenth edition, St. Louis: C. V. Mosby Company, 1958, p. 452.

[39]King, op. cit., pp. 387, 388.

[40]Best, op. cit., p. 885.

[41]Ibid., p. 886.

TABLE I

MEANS OF DISSIPATING BODY HEAT

	Method	Calories	Per cent
a.	Radiation, convection and conduction	1,950	65
b.	Evaporation of water from skin and lungs; release of carbon dioxide	900	30
c.	Warming of inspired air	90	3
d.	Urine and feces (i.e. heat of excreta over that of ingested food and water)	60	2
		3,000	100

In the normal state the heat-regulating centers are stimulated by the temperature of the blood coursing through them and reflexly from the skin.[42] The vasomoter reactions of the vessels of these surfaces are of greatest importance for the maintenance of heat balance.[43] A rich circulation in the skin and subcutaneous tissues functions to carry heat from deeper parts of the body to the surface where it can escape. Further, sweating increases heat loss by providing water to be vaporized; this is under the control of the cholinergic elements of the autonomic nervous system.[44]

Chemical heat control. Regulating production of heat or thermogenesis is chemical heat control,[45,46] so called because it is the result of chemical reactions.[47] The majority of body heat or energy is derived from the oxidation of foodstuffs taking place in the tissues. The muscles and the liver are the major sources of heat,[48] with skeletal muscles furnishing the greatest amount. As a consequence, heat production is

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[42] Wakim, op. cit., p. 84.

[43] Curt Von Euler, "Physiology and Pharmacology of Temperature Regulation," Pharmacological Reviews, 13:362, 1961.

[44] Beeson, loc. cit.

[45] Tuttle, loc. cit.

[46] Zoethout, loc. cit.

[47] Best, op. cit., p. 884.

[48] Ibid., p. 890.

achieved mainly by increasing muscular activity.[49] King suggested that the body's response to cold and its methods of producing more heat are seen in four activities: Increased oxidation, skeletal muscle contraction, shivering, and endocrine activity.[50] Guyton gave similar rationale for the body's thermogenesis: basal metabolism, muscular activity (shivering), effects of thyroxin and epinephrine on cells, and temperature influence on cells.[51]

In brief, thermotaxis keeps the body temperature fairly constant in spite of external or internal conditions which tend to raise or lower it.[52] Thus the life of a warmblooded creature is maintained because through the regulation of the temperature of the body as a whole, the finer and more subtle adjustments of metabolism are effected.[53]

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[49] Tuttle, op. cit., p. 345.

[50] King, op. cit., pp. 386, 387.

[51] Guyton, op. cit., p. 951.

[52] Zoethout, op. cit., p. 451.

[53] John F. Fulton (ed.), A Textbook of Physiology, Seventeenth edition, Philadelphia: W. B. Saunders Company, 1955, p. 1109.

III. FEVER

Etiology of Fever

Multiple theories lend to the somewhat confused declaration of the etiology of fever. Tuttle blamed bacterial toxins or foreign proteins for often creating a disruption of the thermoregulatory center.[54] Another authority stated that endotoxins injure host cells, causing a release of endogenous pyrogen which in turn acts on the cerebral cortex to elicit fever.[55] Von Euler,[56] Atkins[57] and Beeson,[58] were more cautious in fixing the precise responsibility of fever upon pyrogens. The latter asserted that there are many etiological bases for disordered thermoregulation or fever. These are cerebral lesions, increased heat production (as in thyrotoxicosis), impairment of heat loss and tissue injury.[59] Although contributing causation of fever is subject to controversy, all seem agreed that the immediate factor in pyrexia is a hypothalamic disturbance.

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[54] Tuttle, op. cit., p. 348.

[55] Ivan L. Bennett, "Pathogenesis of Fever," Bulletin of the New York Academy of Medicine, 37:443, 444, July, 1961.

[56] Von Euler, op. cit., p. 380.

[57] Elisha Atkins, "Pathogenesis of Fever," Physiological Reviews, 40:627, 628, July, 1960.

[58] Beeson, op. cit., p. 62. [59] Ibid., p. 63.

Course and Symptoms of Fever

The course. The course of fever is marked by three stages: 1) the onset or invasion which may be sudden or gradual, 2) the fastigium or stadium which is the plateau of the febrile reaction, and 3) the defervescence or decline which may be by crisis (sudden, rapid drop) or by lysis (a gradual lowering).[60,61]

Symptoms. The objective signs of fever are alternating flushing and pallor of skin, chilling, sweating, and above-normal body temperature registration on a standard thermometer. Subjective symptoms of pyrexia vary greatly with the person and the disease but include a sensation of skin warmth, a feeling of chilliness, headache, joint and back pain, photophobia, and pain on movement of the eyes.[62]

Types of Fever

There are at least six types of febrile reactions. These are:

1. hyperpyrexia or hyperthermia which usually refers to fever up to 105° F. (40.5° C.) or more.

2. hectic fever, an intermittent pyrexia in which daily fluctuations are great.

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[60]Price, *op. cit.*, p. 461. [61]McClain, *op. cit.*, p. 240.

[62]Beeson, *op. cit.*, p. 61.

3. relapsing fever, short febrile periods interspersed by intervals of one or more days of normal body temperature.

4. constant fever or one which varies little during the day and never declines to normal.

5. intermittent fever, a state of pyrexia of large variations, with elevations far above normal during the day.

6. remittent fever in which changes may be wider than two degrees but with no return to normal.[63]

Significance and Effects of Fever

Fever is not an indication of any specific group of diseases. Instead, it should be looked upon only as a reaction to injury.[64] It is one of the body's "signals of distress."[65] Detrimental effects of pyrexia are weight loss and nitrogen wastage from the stepped-up velocity of metabolic processes, increased strain on the heart, loss of fluid and salt from sweating, and miscellaneous discomforts due to headache, photophobia, general malaise and unpleasant sensations of warmth.[66]

Is fever ever desirable and salutary? Davson suggested that in moderate hyperthermia there is an increase of metabolic

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[63] McClain, loc. cit. [64] Beeson, op. cit., p. 65.

[65] Bertha Harmer and Virginia Henderson, Textbook of the Principles and Practice of Nursing, Fifth edition, New York: The Macmillan Company, 1958, p. 271.

[66] Beeson, op. cit., p. 64.

activity that might confer some advantages to the body such as intensified resistance to infection.[67] Beeson wrote that there are a few infections in which fever seems to be of definite value to the host.[68] Best advocated caution with his declaration that the actual role played by the febrile reaction in the defensive process is unknown.[69] Beeson supported this with his opinion that "there is no reason to believe that pyrexia accelerates phagocytosis, antibody formation or other defense mechanisms."[70] Bennett and Nicastri insisted that any advantage that might lend a host in producing antibodies is likely to be decreased by the enhanced pathogenecity of the infecting organism and by the fact that data are too sparse to permit generalization.[71] It appeared that pyrexia is helpful in signalling an abnormal body condition but is of little, if any other benefit to the human host.

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[67]Davson, _op_. _cit_., p. 773. [68]Beeson, _loc_. _cit_.

[69]Best, _op_. _cit_., p. 897. [70]Beeson, _loc_. _cit_.

[71]Ivan L. Bennett and Anthony Nicastri, "Fever as a Mechanism of Resistance," _Bacteriological Reviews_, 24:20, March, 1960.

IV. EVALUATING BODY TEMPERATURES

Sites for Thermometry

Gration listed four locations of the body which are available for clinically measuring body heat. They are the sublingual space, axilla, groin and rectum.[72] Price added the vagina.[73] Which site offers the most precise registration of body temperature? Kampmeier answered that the temperature may be most accurately determined by rectum.[74] Brown agreed with this by stating, "Rectal temperature readings are to be preferred unless there are definite indications against taking a rectal temperature.[75] Wakim declares that it is generally agreed that the temperature taken rectally is the most reliable index of body heat.[76] Another writer observed, "Rectal temperature is nearer the temperature of the inside of the body than mouth temperature.[77] The findings of one

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[72] Hilda M. Gration and Dorothy L. Holland, The Practice of Nursing, Fifth edition, London: Faber and Faber, Ltd., 1956, p. 22.

[73] Price, op. cit., p. 468.

[74] Rudolph H. Kampmeier, Physical Examination in Health and Disease, Second edition, Philadelphia: F. A. Davis Company, 1957, p. 63.

[75] Amy Frances Brown, Medical Nursing, Third edition, Philadelphia: W. B. Saunders Company, 1957, p. 5.

[76] Wakim, op. cit., p. 79. [77] McClain, op. cit., p. 246.

investigation, with simultaneous oral and rectal thermometries, indicated that oral temperature changes correlate poorly with body temperature alterations measured rectally.[78]

Why Oral Thermometry?

If rectal thermometry is to be strongly preferred to sublingual evaluation of body temperature, why then is oral thermometry practiced so extensively in medical and nursing activities? One author replied that the sublingual method is the simplest, the most convenient and the most comfortable.[79] Another commented that oral temperatures are physically and psychologically much more acceptable to patients than are rectal measurements of body heat.[80]

It is a known fact that the sublingual space is favorable for evaluating body temperature because of the rich blood supply near the surface. The sublingual tissues are readily available for the thermometer's sensitive bulb. The fact that the thermometer can be held in place by the patient with the mouth closed makes oral thermometry a convenient procedure for taking the temperature.[81]

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[78] Jacqueline H. Sellars and Ann E. Yoder, "A Comparative Study of Temperature Readings," Nursing Research, 10:45, Winter, 1961.

[79] Ella L. Rothweiler, Jean Martin White, and Doris A. Geitgey, The Art and Science of Nursing, Sixth edition, Philadelphia: F. A. Davis Company, 1959, p. 562.

[80] Harmer, op. cit., p. 282. [81] McClain, loc. cit.

Conditions Affecting Accurate Oral Thermometry

One of the leading objections to taking the temperature sublingually is the multiplicity of factors that seem to make inaccurate the oral thermometer's record of body temperature. Some of these must be considered because of the wide use of oral thermometry.

The time factor. Timing sublingual thermometry poses a dilemma as mirrored in statements like those that follow: ". . . three minutes is usually long enough;"[82] "Orally-recorded temperatures will be too low if the . . . thermometer is not properly placed for a sufficient length of time;"[83] and, ". . . for oral temperature it should be left in situ below the tongue for at least 3 minutes (preferably 5) or until the maximum is reached. . ."[84] Common practice has set three minutes as the approved minimum time period for oral thermometry. This is substantiated by DeNosaquo's investigation which showed that the average of 493 oral temperature determinations required

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[82] I. S. L. Loudon, "On Taking the Temperature in the Mouth and the Axilla," Lancet, 273:233, 234, August 3, 1957.

[83] Philip Bard (ed.), Medical Physiology, Eleventh edition, St. Louis: C. V. Mosby Company, 1961, p. 527.

[84] Davson, op. cit., p. 757.

three minutes of time to come to within one-tenth of one degree of the final reading.[85]

Food and drink. DeNosaquo's study in 1944 demonstrated that the taking of hot drinks produced a transitory elevation of body temperature and that the drinking of cold beverages caused a temporary lowering of local mouth temperatures which required from fifteen to thirty minutes to return to "normal" levels.[86] In her investigation with distorters of oral temperature Brim found that with the ingestion of hot liquids her fifty subjects' oral temperatures required from twenty to eighty minutes for sublingual temperatures to return to pre-drink readings. With cold liquids the fifty subjects' oral temperatures returned to pre-drink levels from five to ten minutes after ingestion.[87]

Gum chewing. Brim also discovered that gum-chewing may raise or lower the oral temperature. This activity caused

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[85] Norman DeNosaquo, et al., "Clinical Use of Oral Thermometers," Journal of Laboratory and Clinical Medicine, 29:184, 1944.

[86] Ibid., p. 182.

[87] Katherine Brim and Betty Alice Chandler, "Changes in Oral Temperature," The American Journal of Nursing, 48:772, 773, December, 1948.

greater distortion of the sublingual temperatures than did smoking.[88]

Smoking. The distortion of oral thermometry with smoking was reported by Brim to be less prolonged than that with gum-chewing.[89] Nursing personnel would, however, do well to keep in mind the potential for inaccuracy of body temperature evaluation with their smoking patients. McClain[90] and Harmer[91] bear this out in their nursing texts.

Environment. Atmospheric air has little effect on the total body temperature unless it is extremely hot or cold. The exactness of oral thermometry is not endangered because the heat-controlling system maintains a homothermal state.[92] This excludes the influence of atmospheric air on sublingual tissues of an open mouth as mentioned below.

Mouth-breathing. Although no studies seem to have been conducted, several authorities' statements dealing with mouth-breathing and sublingual thermometry are available. Bard[93] and

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[88] Ibid.

[89] Brim, loc. cit.

[90] McClain, op. cit., p. 244.

[91] Harmer, loc. cit.

[92] Kampmeier, loc. cit.

[93] Bard, loc. cit.

Davson,[94] as examples, cited this type of respiration as being cause for mistaken evaluation of body temperature by oral thermometry.

Talking. There appeared to be nothing but casual reference made to the influence of talking upon subsequent sublingual thermometry. No research appears to have been done on the subject. Some physiologists, however, mentioned the part talking plays in altering the temperature of sublingual tissues. Davson wrote, "The reading will be too low if the mouth has been cooled by talking. . ."[95] DuBois stated that in oral thermometry "the reading will be too low if the patient has cooled his mouth by much talking. . ."[96] It seemed plain that with the mouth opened in talking the sublingual tissues are exposed to inrushes of atmospheric air. With such exposure the tissues would tend to adjust their temperature to that of the extraoral air. It would follow then that if the outside air were cooler than the temperature of the sublingual tissues, oral thermometry would change toward the lower heat level. Thus, the sublingual space would be a wrong index of body heat.

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[94]Davson, loc. cit.

[95]Ibid.

[96]DuBois, op. cit., p. 8.

Miscellaneous factors. Other factors found responsible for precluding accuracy of body temperature evaluation by sublingual thermometry included: hot and cold applications to the face,[97] frequent coughing attacks, severe weakness with the patient unable to keep his mouth closed, extreme emotional states, acute oral infections, traumatic injury, surgical operations on the nose or mouth,[98] and various acts of malingering patients such as tapping thermometers, biting them, heating them on radiators or hot water bottles, or warming them by vigorous friction on bedding.[99]

V. SUMMARY

A review of medical literature was done to learn prevailing concepts of the place of oral thermometry in modern medical and nursing practice. The human body temperature was seen as a range with diurnal variation. The hypothalamus' efficient thermoregulatory function was seen with its promoting of physical and chemical heat regulation. Fever was declared to be of uncertain etiology, except for its immediate cause being a disturbance of the hypothalamus. The three stages,

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[97]Harmer, loc. cit. [98]Price, op. cit., p. 467.

[99]Elbert T. Phelps, "Fever--Its Causes and Effects," The American Journal of Nursing, 56:321, March, 1956.

course, symptoms, manifestations and significance of pyrexia were outlined. Evaluating body temperature and the studies suggesting distorters of accuracy in oral thermometry were discussed. Talking prior to thermometry was reported to be of slight detriment to preciseness in measuring body heat by sublingual thermometry. The extent of the distortion from talking was not given; no studies were found indicating the oral temperature reduction resulting from talking.

CHAPTER III

METHOD OF INVESTIGATION, ANALYSIS AND INTERPRETATION

The investigator became involved in this study from the belief that there seemed to be more at stake in the humdrum "TPR" routine than she and other nurses admitted or recognized. It appeared that the pre-thermometry periods of the day were being too lightly treated. Certain patient activities that might influence oral thermometry appeared to be ignored.

I. THE PILOT STUDY

Initially the study's hypothesis was that mouth breathing caused a lowering of the sublingual temperature. A pilot investigation using the experimental method was directed with seven students as volunteer subjects.

For thirty minutes the subjects observed the restrictions of no eating, drinking, smoking, gum-chewing or mouth-breathing. To keep them from involuntary mouth-breathing two by four inch adhesive tape strips were placed over their mouths. Next three-minute oral temperatures were taken. Then followed a thirty minute period of mouth-breathing with the aid of swimmer's nose clips. The second three-minute sublingual temperature was taken. The reduction of the temperature readings were calculated from the data cards which sought the following information: age to the nearest birthday, subject's number, control temperature, experimental temperature and the temperature difference.

The findings of the pilot study (See Table II) revealed marked reductions of oral temperatures after mouth-breathing. The lowerings were so great that the investigator became suspicious. How could such a pronounced effect as mouth-breathing showed on oral thermometry receive only causal mention in literature? The researcher conducted further experimentation on herself over the next few days. These findings also indicated a need to carefully re-evaluate the hypothesis and the plan of experimentation. (See Table III) The investigator decided that mouth-breathing did not seem to require experimental research, that it appeared obvious that with the mouth open oral tissues would change in temperature.

It was felt that the enforced mouth-breathing was artificial to actual patient-care situations. It was decided that few people spend much time breathing exclusively through their mouths, that those who do are probably noticed by nurses, and that respiratory rates are altered under conditions such as existed in the pilot study. It was felt that the hypothesis

TABLE II

PILOT STUDY FINDINGS - SUBLINGUAL TEMPERATURES
OF SEVEN SUBJECTS WITH REDUCTIONS
IN DEGREES FAHRENHEIT

Subject	CT	ET	Reduction
1	98.0	97.6	.4
2	98.6	97.4	1.2
3	99.2	98.4	.8
4	98.8	97.4	1.4
5	98.4	97.0	1.4
6	99.0	96.8	2.2
7	98.8	97.8	1.0

CT - After 30 Minutes Nasal Breathing
ET - After 30 Minutes Mouth Breathing

TABLE III

EXTENDED PILOT STUDY SHOWING TEMPERATURE REDUCTIONS IN DEGREES FAHRENHEIT OF 3-MINUTE ORAL THERMOMETRIES AFTER VARIOUS BREATHING PERIODS

Nose-Breathing (in minutes)	Mouth-Breathing (in minutes)	Reductions
15	15	1.0
6	6	1.0
5	5	1.6, .8, 1.0, 1.6, and .6
3	3	.4
2	2	.2
1	1	0
15	2	.8
*2	30	-.8**

*The nose-breathing followed the mouth-breathing for this experiment.

**This negative reduction indicates that the sublingual temperature rose after the nose-breathing.

would have to be abandoned in favor of a more realistic problem relating to oral thermometry practice.

II. THE EXPERIMENT

Because it is a universal habit and apparently a favorite passtime for many patients, talking was viewed as a possible threat to the accuracy of sublingual measuring of body temperature. Literature also supported such a view. The hypothesis adopted for the study was that after a period of talking the sublingual temperature is lowered. In order to test the influence of talking upon subsequent oral thermometry an experiment was conducted using the one group technique.

The Subjects

Sixty-one college students became the subjects. These were students in the health professions who resided in the women's residence halls. The researcher went personally to evening assemblies and asked for volunteers to serve as subjects. It was felt that students in the health fields would be more cooperative in such a study where placement of thermometers was vital. They were all apparently in good health and had no obstructions to hinder nasal breathing.

Time

The experiment was conducted during evening study periods between seven and ten for the convenience of the subjects.

The Procedure

The subjects came in groups of two to eleven in nine sessions. Each subject found on the large table before her the following items: a facial tissue, a three by five inch data card, a two by four inch adhesive tape strip, an oral thermometer (shaken down to 95° F. or lower), and a booklet entitled, Florence Nightingale.[100] The subjects also brought their own study and/or hobby materials with them. The data card employed in the experimentation was a simplification of the one used in the pilot study. A sample is found in Figure 3.

The experimental plan used for each group was as given below:

1. The subjects were asked to stay in the room for thirty minutes before the first temperature-taking in order that the investigator could control important activities which might have marred the reliability of the experiment. The six restrictions imposed upon the subjects were no eating, drinking,

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[100] Grace T. Hallock and Clair E. Turner, Florence Nightingale, Health Heroes Series, Metropolitan Life Insurance Company, New York: G. P. Putnam's Sons, 1959, 24 pages.

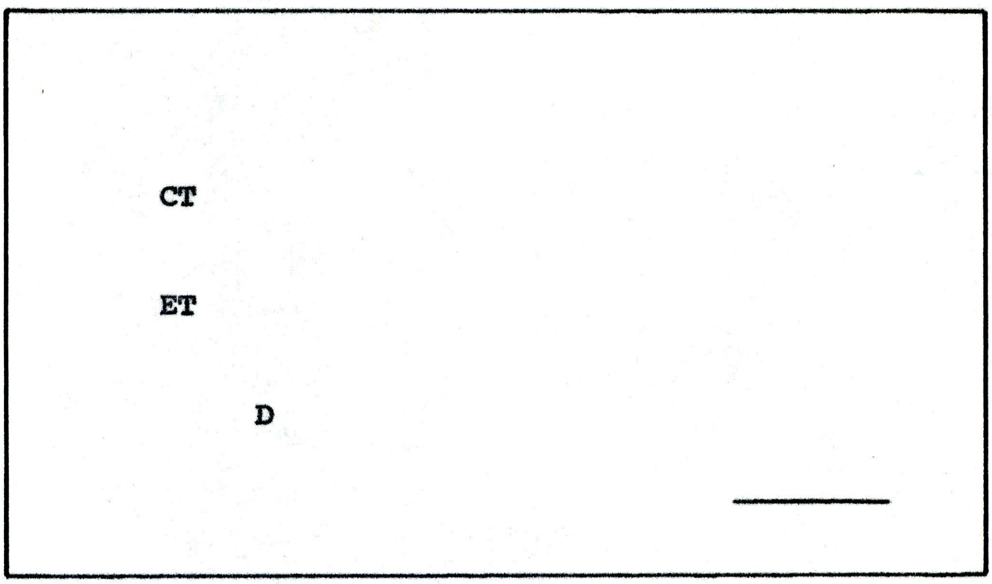

FIGURE 3

INDIVIDUAL DATA CARD FOR EXPERIMENT
TESTING EFFECT OF TALKING ON
ORAL THERMOMETRY

CT - Control Thermometry
ET - Experimental Thermometry
D - Difference

smoking, gum-chewing, mouth-breathing or talking. These were chosen because they were felt to be the most significant of the factors that play havoc with sublingual temperatures. To assist the subjects in observing the last two restrictions the adhesive strips were placed over their mouths for the thirty minutes.

Upon a signal from the investigator

2. The subjects placed the thermometers under their tongues for the three-minute sublingual temperature evaluation, known as the control thermometry (CT).

3. The investigator read the thermometers, recorded the registrations on the data cards and shook down the thermometers to 95° F. or below.

4. Immediately at the end of the control thermometry the subjects read aloud for ten minutes - the experiment's "talking." The subjects were free to choose the reading matter, the booklet provided or their own materials.

5. After the reading aloud the thermometers were replaced for the second three-minute sublingual temperature evaluation, known as the experimental thermometry (ET).

6. The investigator again read the thermometers, recorded the second readings on the cards, calculated the

temperature reductions, and transferred the information to the master data form.[101]

Phisohex and water-saturated cotton balls were used for mechanically cleansing the thermometers. Then the instruments were placed in 2 per cent Amphyl for at least fifteen minutes. This method of thermometer disinfection was recommended by Rothweiler.[102]

III. ANALYSIS OF DATA

The temperature reductions of the 61 subjects are shown in Figure 4. Nine, or about 15 per cent, of the subjects, had no change in sublingual temperature. Nineteen, or 31 per cent, of the group experienced two-tenths of a degree reduction. Eighteen, or 30 per cent, of the 61 showed a temperature lowering of four-tenths of a degree. Seven, or 11 per cent, of the group had six-tenths of a degree reduction in sublingual temperature following the period of "talking." The remaining 13 per cent experienced miscellaneous reductions of eight-tenths of a degree, one degree, one and eight-tenths of a degree, and negative reductions of two-tenths and four-tenths of a degree.

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[101]See Appendix

[102]Rothweiler, <u>op</u>. <u>cit</u>., p. 563.

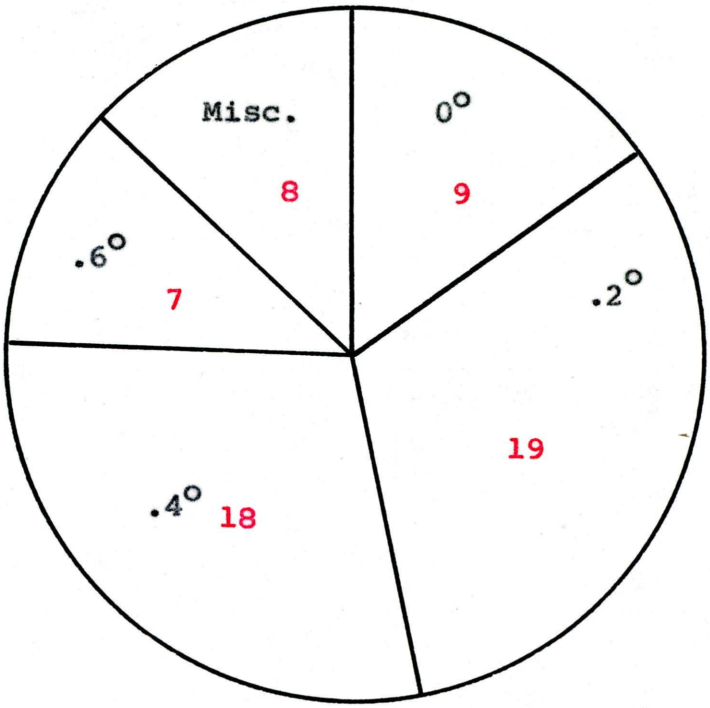

FIGURE 4

SUBLINGUAL TEMPERATURE REDUCTIONS OF 61 SUBJECTS
FOLLOWING TEN MINUTES READING ALOUD
(NUMBER OF SUBJECTS IN RED,
DEGREES IN FAHRENHEIT)

A statistical analysis employing the t test was done to determine the significance of the temperature reductions.[103] The average decrease was .321 degrees Fahrenheit. There was better than a 99.9 per cent probability of significance that the "talking" caused a lowering of the sublingual temperatures. The probability that the observed temperature reductions were due to chance was better than the .001 level of significance.

IV. INTERPRETATION

As seen in Figure 5 the greatest percentage of the 61 subjects showed temperature reductions of two-tenths of a degree. The next largest group had lowerings of four-tenths of a degree. Zero reductions were found with 15 per cent of the subjects. This last group with the two-tenths of a degree reduction group formed about 46 per cent of the 61 subjects. Thus, it was found that nearly half of the experimental group experienced sublingual temperature declines of two-tenths of a degree or no observable reduction whatsoever. Hence, it was interpreted that almost half of the subjects had no significant drop in oral temperatures after the "talking."

Why was there such a spread of observed sublingual temperature reductions? Furthermore, what was the reason for the negative reductions in oral temperature? It was felt that the

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[103] See Appendix B.

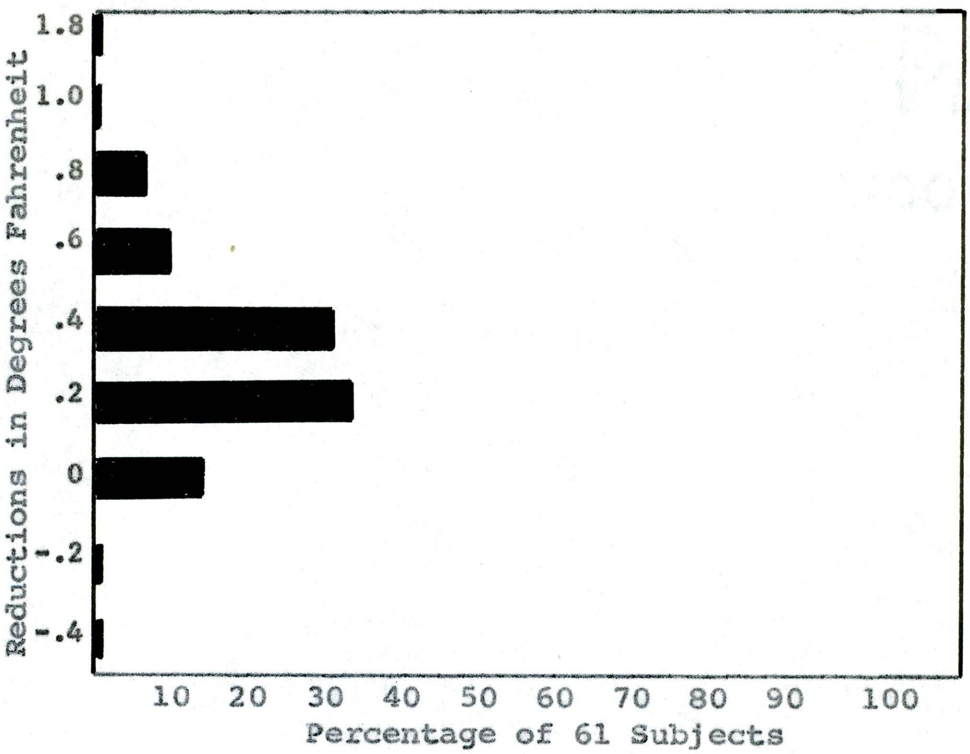

FIGURE 5

PERCENTAGE BREAKDOWN OF THE 61 SUBJECTS' ORAL THERMOMETRY REDUCTIONS wide spread and the negative reductions shared possible causes. These were seen as individual differences in 1) laughing, 2) oral circulation, and 3) the extent of the movement of jaws, lips and tongues with the "talking."

Many of the subjects were observed to laugh with the simultaneous reading aloud. It was felt that this caused the sublingual tissues to be exposed to the extra-oral air more than if the subjects had not laughed. Sublingual tissue temperatures were believed to be altered according to the different ways of laughter.

Because the oral thermometer's registering is dependent upon the heat created by the large vessels under the tongue, oral thermometry was seen as being influenced by the blood-flow through the sublingual tissues. This varied with each of the 61 subjects. Hence, oral circulation was considered to contribute to the various temperature reductions observed.

Finally, in reading aloud some of the subjects appeared to move their jaws, lips and tongues faster than they ordinarily would. It was viewed as probable that this caused a more rapid sublingual circulation with a resulting increase in sublingual tissue heat. This also differed with the individual subject and was considered to be part of the rationale for the spread of temperature changes found in the experiment.

Talkative patients were seen as potential detriments to themselves. To illustrate, a loquacious patient was said to have an oral temperature of 99.8° F. If he had not been chatting so eagerly the thermometer would have registered 100.0° F. The man might have been given Aspirin since his physician had ordered, "A.S.A. gr. x prn fever 100.00 F. or above." Instead, the pyrexia was allowed to rise. Besides this, the man was not included in the 8 p.m. "TPR check" "because, said the nurse, his afternoon temperature wasn't 100.0°, and we don't have to take any temperatures that weren't elevated."

Another consideration seemed relevant in the interpretation of the data analyzed in the study. Oral thermometers are read to the nearest two-tenths of a degree. It was felt that any nurse was liable to read a thermometer toward the wrong two-tenth degree calibration. This was thought to be another potential obstacle to accuracy of sublingual thermometry with the very talkative patient. There appeared to be possibilities for undesirable consequences in patient-care, especially for 50 per cent of the subjects. This group included those with temperature reductions of four-tenths, six-tenths and eight-tenths of a degree; one degree, and, one and eight-tenths of a degree. It seemed obvious that a mistakenly added two-tenths of a degree lowering to any of these reduced sublingual temperatures would only augment the unfortunate circumstance. It was felt that these findings might be clinically important in the medical and nursing management of highly talkative patients with fever.

Upon the basis of the results of the investigation, the study's hypothesis was accepted for the loquacious patient, that talking does lower the sublingual temperature.

V. SUMMARY

A pilot study was conducted with seven subjects to find out the effect of mouth-breathing upon oral thermometry. The hypothesis was discarded and the experimental plan altered after the findings suggested that the effect of mouth-breathing in lowering oral temperature was very pronounced and did not require experimental demonstration. Sixty-one subjects participated in the experiment to determine the influence of talking on subsequent sublingual thermometry. After thirty minutes of no eating, drinking, smoking, gum-chewing, mouth-breathing or talking three-minute control oral temperatures were taken. Next there were ten minutes of reading aloud, followed by the three-minute experimental oral thermometry. Data analysis by the t test indicated that the "talking" lowered sublingual temperatures with better than a 99.9 per cent probability of significance. Fifty per cent of the cases, those with temperature reductions of from four-tenths of a degree to one and eight-tenths of a degree, were seen to suggest factors of clinical importance in the treatment of pyrexia in very talkative patients. It was concluded that the study's hypothesis be accepted, that the talking of such patients does lower the sublingual temperature.

CHAPTER IV

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

I. SUMMARY

It was the purpose of this study to determine the effect of talking upon subsequent oral thermometry. A review of literature was made and experimentation conducted with 61 female subjects. The survey of the written revealed that the human body has an astounding capacity for maintaining thermal homeostasis. The thermostat is the hypothalamus which functions with physical and chemical processes to effect heat loss and production. Thus the normal range of body temperature was said to be sustained. Fever was seen to be a manifestation of a disruption of hypothalamic activity. Pyrexia's uncertain etiology, its course, symptoms and types, and its clinical significance were discussed.

The literature reviewed gave the various sites for clinically measuring body heat, namely: the sublingual space, axilla, groin, rectum and vagina. Although rectal thermometry was declared to be the procedure of choice for optimum preciseness of body temperature evaluation, oral thermometry was said to be generally practiced because of its psychological preferability with patients. The prominent factors in altering sublingual tissue temperature were listed. The time interval recommended was three minutes as the minimum. Food and drink, gum-chewing, smoking, mouth-breathing and talking were stated to be causes of changes in sublingual temperature. Miscellaneous other conditions believed to affect the accuracy of oral thermometry in revealing the degree of body heat included hot and cold applications to the face, coughing attacks, acute oral infections, surgical procedures of the nose or mouth, and malingering acts by patients.

Talking and its effect upon oral thermometry received only scant attention in literature. Statements were found suggesting that the mouth is cooled by talking. Therefore, it was inferred that the sublingual temperature would be liable to alter from the introduction of atmospheric air with talking. The amount of temperature change accompanying talking was not available for review.

After a pilot study with seven female students, an experiment was done to establish the extent of oral temperature lowering after a period of talking. The subjects were 61 volunteers from the women's residence halls of a selected university. The group was its own control. The three-minute sublingual temperatures were taken in this manner: The control thermometry was done following a thirty-minute period of no eating, drinking, smoking, gum-chewing, mouth-breathing or talking. The second temperature evaluation or the experimental thermometry was done after a ten-minute interval of "talking" in which the subjects read aloud.

The temperature reductions were analyzed by the t test. The "talking" was found to cause a lowering of sublingual temperature with better than a 99.9 per cent probability of significance and on a level of better than a .001 probability that chance was responsible for the lowerings.

II. CONCLUSIONS

Upon the basis of the findings of the study the hypothesis was accepted. That is, if a patient talks continuously, similar to the "talking" in the experiment, the sublingual temperature will be significantly lowered. Ultimate conclusion appeared to pivot about one query. That was, "Did the talking of the experiment approximate closely enough the conversing of talkative patients?" If it did, the positive response was seen to dictate an acceptance of the hypothesis, that after a period of talking the sublingual temperature is lowered. If the "talking" did not resemble the conversation of chatty patients, it would indicate a rejection of the hypothesis.

The investigator was moved towards thinking that the "talking" did not represent every-day conversing. Many of the subjects were observed to read apparently more loudly and more rapidly than their usual conversational patterns. Further, it seemed unlikely that a significant number of patients could be expected to maintain a constant flow of verbalization for ten minutes. Instead, it was felt that even very loquacious patients would stop periodically to permit their listeners at least a phrase or two in response. The investigator held that such intervals of silence would allow sublingual tissues to alter in temperature, back towards pre-talking, closed-mouth levels.

The researcher also felt that patients with elevated temperatures would tend to be more subdued and contented to rest quietly than when they were afebrile. It was believed that even talkative patients would most likely be less chatty when they had fever. Thus, the important elevated oral temperatures were seen as not seriously threatened by talkativeness.

It was concluded that nursing service personnel would be wise to notice the type of conversations being enjoyed in their patients' rooms. Extremely talkative patients were felt to be at least a potential threat to the accuracy of the daily "TPRs." Even potential hazards to preciseness of body temperature evaluations were viewed as sufficiently important as to warrant nursing intervention. Finally, it was concluded that if the chatty patient seemed to be carrying on a "you-can't-get-a-word-in-edgewise" verbal conquest, oral thermometry should be postponed or a word gotten in edgewise.

III. RECOMMENDATIONS

Because of the findings of this study it is recommended that

1. Talking habits of patients be carefully analyzed to see if there are occasions of prolonged, one-sided conversing. If there are, the chatty patients should be asked to discontinue talking for ten to fifteen minutes before oral thermometry.

2. Visitors be asked to let patients rest from talking if it is observed that the patients are eager to do all of the speaking.

3. Nursing service administrators promote increased awareness among all nurses of the potential threat of patient-talkativeness on the reliability of subsequent oral thermometry.

Further research could be done to study:

1. The amount of sublingual tissue cooling with this study's "talking" and with the speaking-then-listening form of more nearly every-day conversational exchange.

2. Talkativeness and its influence upon oral thermometry in patients with sublingual temperatures of over 99° F., comparing reductions with talking and heighths of the febrile reactions.

3. Sublingual thermometry and talking in a "give and take" conversational situation (e.g. Subjects could "talk" in pairs with alternate reading and listening to each other, questions and answers perhaps.)

4. The comparisons of the reductions in oral thermometer readings with talking by whispering, normal conversational volume, and loud verbalizing.

5. The influence on oral thermometry of talking while having an oral thermometer in the sublingual space.

6. Different ages and talking and oral thermometry.

7. The time required for the sublingual temperature to resume pre-talking levels.

8. A comparison of the reduction in sublingual temperature after mouth-breathing and after talking.

9. What types of talking are done from fifteen minutes before and up to the time of oral thermometry (with the critical incident method of research).

10. The comparison of the effects of boisterous laughing and talking on oral thermometry.

11. The influence of various lengths of time of talking to subsequent oral thermometry.

12. The factor of sex and effects of talkativeness, upon sublingual thermometry. (Men sometimes seem to talk more loudly than women.)

13. Effects of talking on oral thermometry in different room temperatures.

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APPENDIXES

APPENDIX A

MASTER DATA RECORD

Subject	Control Thermometry	Experimental Thermometry	Reductions (degrees Fahrenheit)
1	99.0	98.8	.2
2	98.8	98.8	0
3	98.8	98.0	.8
4	99.0	98.6	.4
5	99.2	99.0	.2
6	99.0	98.6	.4
7	98.0	98.2	-.2
8	98.8	98.6	.2
9	99.0	98.8	.2
10	99.6	99.2	.4
11	98.4	98.0	.4
12	98.4	98.0	.4
13	98.6	98.2	.4
14	99.0	98.8	.2
15	99.2	99.4	-.2
16	98.2	98.2	0
17	98.8	98.9	0
18	98.0	98.0	0
19	99.0	98.6	.4
20	98.4	96.6	1.8
21	98.8	98.6	.2
22	99.0	98.8	.2
23	98.6	98.4	.2
24	98.6	98.2	.4
25	98.8	98.6	.2
26	99.2	99.0	.2
27	99.0	98.8	.2
28	99.0	98.2	.8
29	98.0	98.0	0
30	98.6	98.2	.4
31	98.6	98.2	.4
32	98.4	98.4	0
33	98.8	98.4	.4
34	98.6	98.4	.2
35	98.6	98.2	.4
36	99.4	99.2	.2
37	99.0	98.4	.6
38	99.2	98.6	.6
39	98.4	98.0	.4
40	98.8	98.2	.6

Subject	Control Thermometry	Experimental Thermometry	Reductions (degrees Fahrenheit)
41	98.2	98.2	0
42	99.2	98.2	1.0
43	98.2	98.2	0
44	99.2	99.0	.2
45	98.0	97.4	.6
46	99.0	98.6	.4
47	98.8	98.4	.4
48	99.0	98.6	.4
49	98.8	98.8	0
50	99.2	99.6	-.4
51	99.0	98.8	.2
52	99.0	98.8	.2
53	98.6	98.0	.6
54	98.6	98.2	.4
55	98.6	98.4	.2
56	99.4	99.0	.4
57	99.0	98.4	.4
58	98.6	98.4	.2
59	98.4	98.2	.2
60	98.6	98.0	.6
* 61	99.2	98.4	.8

*Sixty-one subjects were chosen to facilitate ready use of the t table in statistical analysis.

APPENDIX B

FORMULAS USED IN DATA ANALYSIS FOR "t" TEST

1)	$D = X_1\ (CT) - X_2\ (ET)$	Difference (reduction) equals the control thermometry minus the experimental thermometry.
2)	$\bar{D} = \dfrac{\Sigma D}{N}$	Average difference (average reduction) equals the sum of the reductions, divided by the number of cases.
3)	$d = D - \bar{D}$	A deviation equals the reduction minus the average reduction.
4)	$SD = \dfrac{d^2}{N - 1}$	The standard deviation equals the square root of the sum of the deviations squared, divided by the number of subjects less 1.
5)	$SE_{\bar{D}} = \dfrac{SD}{\sqrt{N}}$	The standard error of the average reduction equals the standard deviation divided by the square root of the number of subjects.
6)	$DF = N - 1$	The degrees of freedom equal the number of cases less 1.
7)	$t = \dfrac{\bar{D}}{SE_{\bar{D}}}$	The t value equals the average reduction divided by the standard error of the average reduction.

LOMA LINDA UNIVERSITY

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THE EFFECT OF TALKING ON ORAL THERMOMETRY

by

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An Abstract of a Thesis

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in the Field of Nursing

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ABSTRACT

In this study an experiment was done to find out the effect of talking upon subsequent oral thermometry. A need for such a study was seen in 1) the apparent indifference of nursing service personnel to possible influences of talkativeness on sublingual temperature evaluations and 2) the seeming want of experimental evidence to indicate that talking does change the sublingual temperature. The sixty-one female students who volunteered as subjects were of the health professions at a selected university. For a thirty-minute period the subjects observed the restrictions of no eating, drinking, smoking, gum-chewing, mouth-breathing or talking. Three-minute control oral temperatures were then taken, followed by ten minutes of reading aloud. Next the three-minute experimental oral thermometry was done and temperature alterations calculated. The average temperature reduction was .321 degrees Fahrenheit. In 15 per cent of the subjects there was no change in sublingual temperatures, 31 per cent had two-tenths of a degree reduction, 30 per cent four-tenths of a degree and 11 per cent six-tenths of a degree lowering. The remaining 13 per cent of the subjects showed miscellaneous reductions of eight-tenths of a degree, one degree and negative reductions of two-tenths and four-tenths of a degree. Data were analyzed with the t test. The experimental talking was found to cause a lowering of sublingual temperature to better than a 99.9 per cent probability of significance and with better than a .001 level of significance that the reductions were due to chance. It was concluded that if the experiment's "talking" approximated the conversing of talkative patients the hypothesis could be accepted, that talking lowers the sublingual temperature. Although the findings were statistically significant, the average temperature reduction was so slight that the findings are probably not clinically important except for the extremely talkative patient. Recommendations were made concerning the management of the very talkative patient and oral thermometry and areas deserving further investigation.